154/01214 A04

IN THE CLAIMS

Kindly replace the present claims with the following claims, in which claims 1-3, 7, 10, 22, 24-27 and 29 have been currently amended and claim 28 has been currently cancelled.

1. (Currently Amended) A method of reconstructing tomography images comprising:

acquiring data on the geometric coordinates of detection of radiation from individual ~~radiation~~ nuclear events;

separately distributing a weight of each of the individual ~~radiation~~ nuclear events along a line of flight associated with the event determined from the acquired data on the geometric coordinates of detection of the individual event; and

iteratively reconstructing the image based on the distributed weights.

2. (Currently Amended) A method according to claim 1 wherein the weights are distributed in voxels along the line of flight and wherein the weight of a particular event is distributed based on the probability that [[an]] nuclear event occurred in particular voxels.

3. (Currently Amended) A method according to claim 1 wherein the line of flight of an event is determined based on the position at which the radiation from the nuclear event was detected on a detector and the acceptance direction of a collimator through which the detector receives radiation associated with the events.

4. (Previously Presented) A method according to claim 1 wherein the line of flight of an event is determined by the position on a detector on which the event is detected and the location of the source of radiation associated with the event.

5. (Previously Presented) A method according to claim 1 wherein the line of flight associated with an event is determined by detection of two coincident photons.

6. (Previously Presented) A method according to claim 1 wherein iteratively reconstructing the image comprises applying an iterative expectation maximization (EM) method on the data in sub-sets.

7. (Currently Amended) A method according to claim 6 wherein the individual detected nuclear events form the separate sub-sets.

8. (Previously Presented) A method according to claim 6 wherein the sub-sets are formed based on the time of acquisition of events.

9. (Original) A method according to claim 6 wherein the sub-sets are formed from unrelated events.

10. (Currently Amended) A method of reconstructing tomography images comprising:

acquiring data on the geometric coordinates of detection of radiation from individual ~~radiation~~ nuclear events; and

applying an iterative expectation maximization (EM) method on the data in sub-sets which are formed based on the time of acquisition of the data on the geometric coordinates of detection of the ~~events~~ radiation from the events.

11. (Previously Presented) A method according to claim 6 or claim 10 wherein the subsets consist of data having less than a 180 degree view angle.

12. (Previously Presented) A method according to claim 6 or claim 10 wherein iterations of the EM method are performed prior to the acquisition of data having a 180 degree angle of view.

13. (Previously Presented) A method according to claim 6 or claim 10 wherein iterations are commenced on receipt of the first detected event.

14. (Previously Presented) A method according to claim 6 or claim 10 comprising displaying an evolving image based on successive iterations of the iterative EM method on a display device.

15. (Previously Presented) A method according to claim 6 or claim 10 and including determining if a study should be terminated based on the image quality of an image after an iteration.

16. (Previously Presented) A method according to claim 6 or claim 10 wherein intermediate images are filtered with a smoothing filter between iterations of the EM method.

17. (Previously Presented) A method according to claim 6 or claim 10 wherein intermediate images are filtered with a noise reducing filter between iterations of the EM method.

18. (Previously Presented) A method according to claim 6 or claim 10 wherein data is reused in subsequent iterations of the EM algorithm.

19. (Previously Presented) A method according to claim 1 or claim 10 wherein the image is a three dimensional image.

20. (Previously Presented) A method according to claim 1 or claim 10 wherein the iterative method comprises reconstructing from the events without forming two dimensional data sets.

21. (Previously Presented) A method according to claim 1 or claim 10 wherein the iterative method comprises reconstructing from the events without forming sinograms for slices of the three dimensional image.

22. (Currently Amended) A method of reconstructing tomography images comprising:

acquiring data on the geometric coordinates of detection of radiation generated by individual ~~radiation~~ nuclear events; and

iteratively reconstructing a three-dimensional image from the unbinned individual ~~radiation~~ nuclear events.

23. (Original) A method according to claim 22 wherein reconstructing the image comprises utilizing an expectation maximization (EM) method acting on individual unbinned events.

24. (Currently Amended) A method according to claims 1, 10 or 22 wherein the ~~radiation~~ nuclear events are nuclear emission events and the images are emission tomography images.

25. (Currently Amended) A method according to claims 1, 10 or 22 wherein the ~~radiation~~ nuclear events are positron decay events and wherein the images are PET images.

26. (Currently Amended) A method according to claims 1, 10 or 22 wherein the ~~radiation~~ nuclear events are represented by photons which have passed through a subject and wherein the images are transmission tomography images.

154/01214 A04

27. (Currently Amended) A method according to claim 26 wherein the ~~radiation events are nuclear disintegrations and wherein the~~ images are nuclear transmission tomographic images.

28. (Cancelled)

29. (Currently Amended) A method according to claim 1, 10 or 22 wherein the line of flight associated with the ~~radiation~~ nuclear events form a fan beam.

30. (Previously Presented) A method according claim 1, 10 or 22 wherein the lines of flight associated with the events form a cone beam.

31. (Original) A method of reconstructing positron emission tomography (PET) images comprising:

acquiring data on the geometric coordinates of detection of individual positron emission tomography events utilizing a plurality of spatially continuous area detectors; and

reconstructing the image utilizing an expectation maximization (EM) method acting on individual unbinned events.

32. (Previously Presented) A method according to claim 31 wherein the spatially continuous detectors are substantially planar detectors.

33. (Original) A method of reconstructing positron emission tomography (PET) images comprising:

acquiring data on the geometric coordinates of detection of individual positron emission tomography events utilizing a plurality of substantially planar area detectors; and

reconstructing the image utilizing an expectation maximization (EM) method acting on individual unbinned events.

34. (Original) A method according to any of claims 31-33 wherein the plurality of detectors consists of two such detectors.

35. (Previously Presented) A method according to any of claims 31-33 wherein the images are three dimensional images.